**NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_\_\_\_\_ PER. \_\_\_\_**

**LAB: HOUSEHOLD/ENVIRONMENTAL pH**

**BACKGROUND**

How acidic or basic a substance is can be measured by the pH scale. Anything that is an **acid** will have a pH of 0-6.9, anything that is a base will have a pH of 7.1 – 14 and anything that is **neutral**, will have a pH of 7.0. We eat many substances of different pH as well as those abiotic factors that surround us that are either acidic or basic. For example, your blood has a pH of 7.0 and it is important that your blood pH remains stable – this is one way your body maintains homeostasis. If you blood pH becomes acidic, you can suffer from a condition called acidosis. Also, when you suffer from “acid indigestion”, this means that your stomach has a very, very low pH. To treat this, you take an “antacid” to “neutralize” your stomach acids. What this means is that you add a base to an acid to make the pH neutral. So, an antacid like tums, etc., is really a base that when mixed with your stomach acids, creates a neutral solution so that you feel better. Substances used to change the pH and hold it steady are called **buffers**.

pH is test using litmus or pH paper that you soak in the substance you are testing and then compare it to a chart to the actual pH. If you go on the pH scale from a pH of 5 to a pH of 6, the pH increases by 10 times. So, if one substance has a pH of 5 and another substance has a pH of 7, the substance with a pH of 7 is 100 times (10 x 10 = 100) more basic (because you went up on the pH scale).

In this lab, you will determine the pH of some household substances, foods and substances that are important in our environment.

**PRE-LAB DISCUSSION QUESTIONS**

1. Identify the pH range for the following:

**ACID – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**BASE – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**NEUTRAL – \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

2. List the 12 substances that we will be testing in this lab.

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3. What will you use to test pH? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. Why should you not touch the “testing” end of the pH paper with your bare hands? \_\_\_\_\_\_\_\_

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5. How will you determine the pH of each substance? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**MATERIALS**

pH paper spot plates paper towels pipette lemon juice distilled water

pond water tap water salt water ammonia baking soda cola

soap bleach tomato sauce vinegar

**PROCEDURE**

1. Using the pipette, fill each well on your spot plate with the following order of substances – **BRING YOUR SPOT PLATE TO THE FRONT OF THE ROOM – DO NOT REMOVE THE SUBSTANCES FROM THE TEACHER’S DESK.**

1. Lemon Juice

2. Distilled Water

3. Pond Water

4. Tap Water

5. Salt Water

6. Ammonia

7. Baking Soda

8. Cola

9. Detergent

10. Bleach

11. Tomato Sauce

12. Vinegar

2. Record the substances in Data Table 1 and predict whether that substance will be an acid a base or neutral.

3. Using a piece of pH paper, place the colored portion in the liquid in the well for substance 1 for a few seconds.

4. Remove the pH paper and compare it to the chart on your pH paper container.

5. Record the pH in Data Table 1.

6. Repeat steps 3 – 5 for each of the remaining substances.

7. Record in Data Table 1, the actual pH range for the substances, i.e, acid, base or neutral.

**RESULTS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Well No.** | **Name of Substance** | **Predicted pH: (Acid, Base or Neutral)** | **Actual pH (number)** | **Actual pH Range: (Acid, Base or Neutral)** |
| **1.** |  |  |  |  |
| **2.** |  |  |  |  |
| **3.** |  |  |  |  |
| **4.** |  |  |  |  |
| **5.** |  |  |  |  |
| **6.** |  |  |  |  |
| **7.** |  |  |  |  |
| **8.** |  |  |  |  |
| **9.** |  |  |  |  |
| **10.** |  |  |  |  |
| **11.** |  |  |  |  |
| **12.** |  |  |  |  |

**TABLE 1: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**CONCLUSION**

1. Which substances had the lowest pH? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2. Which substances had the highest pH? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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3. Which substances were neutral? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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4. If a substance has a pH of 3, how many times more acidic is it than a solution with a pH of 6

(re-read the background) & show your work? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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5. If a lake has suffered from the effects of acid rain and now has a pH of 3, what could be done

to correct raise that pH? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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6. What is the pH of human skin (look this up)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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7. What is the pH of normal rainwater? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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8. What is a buffer and how does it work? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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9. What is acid rain and why is it harmful? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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10. What industries contribute to the problem of acid rain? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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